MTM

THE JOURNAL OF METHODS-TIME MEASUREMENT

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In This Issue . . . . .

MTM ASSOCIATION FOR STANDARDS AND RESEARCH

The Journal of Methods-Time Measurement is dedicated to the technical aspects, application developments and general news items concerning the advancement of MTM.

The Journal encompasses the fields of endeavor that were formerly publicized in the MTM Newsletter and MTM Bulletin.

The technical section of the Journal is concerned chiefly with recent research developments both from the established research program at the University of Michigan, Ann Arbor, Michigan, and from somewhat smaller allied projects being conducted throughout the Association membership.

New applications of MTM as well as refinements of established applications are presented in the Application Section to illustrate specific approaches to management problems that can be solved through the use of Methods-Time Measurement.

Current events in the lives of persons associated with MTM are described in the general news section.

The Editorial Staff welcomes contributions for all three sections described.

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MTM ASSOCIATION FOR STANDARDS AND RESEARCH

THE JOURNAL OF METHODS-TIME MEASUREMENT

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ARE *YOU* INTERESTED IN BELONGING TO THE MTM ASSOCIATION?

The Association is a non-profit organization, the purpose of which is to develop the competent, consistent, and ethical application of Methods Time Measurement.

In order to carry out this purpose, the Association: conducts basic and applied research; compiles available information regarding the development and application of MTM; and establishes standards to perpetuate the consistency of high quality work accomplished by the member organizations and individuals engaged in the use of MTM.

You have shown an interest in MTM by subscribing to the "Journal". Active participation in some or all of the phases of MTM development may be yours by becoming a member of the Association.

You may qualify for membership under one of the following classifications: (1) Sustaining, (2) Professional, (3) Associate, (4) Chapter, and (5) Honorary.

SUSTAINING MEMBERS are industrial companies and commercial enterprises interested in furthering the objectives of the MTM Association. Sustaining members may have one representative to the Association, who is allowed one vote. ALL DUES FROM SUSTAINING MEMBERS ARE APPLIED EXCLUSIVELY TO RESEARCH. Annual dues, a minimum of $100.00. Qualifications: (1) To have paid such dues. (2) To understand thoroughly the objectives of the Association.

PROFESSIONAL MEMBERS are management consultants who have been applying MTM with success in the plants of their individual clients, and/or who have been trained in MTM by one of the present professional members. Thorough investigation, screening, and testing by the Membership Committee is a must in this classification. Annual dues $500.00; initiation fee $500.00.

ASSOCIATE MEMBERS are drawn from individuals in the teaching profession at accredited schools or universities whose work is actively related to management or engineering and particularly to those engaged in teaching of MTM principles and practices. They must have secured their training in courses approved by the Association, have signed the Code of Ethics, make contributions to the advancement of MTM, and be screened by the membership of the Association. Annual dues are nominal, $15.00 per year.

CHAPTER MEMBERS are accepted community associations, comprised of individuals interested in MTM, which support the aims and purposes of the MTM Association. Annual dues $5.00 per individual in the Chapter.

HONORARY MEMBERS are drawn from those who have made outstanding contributions to the background, development, and application of MTM. Such membership shall be conferred only upon a two-thirds vote of the entire Board of Directors.

Further information can be obtained by contacting the Executive Secretary of the MTM Association, 531 E. Liberty St., Ann Arbor, Michigan.

TECHNICAL

USE OF MTM TO IMPROVE ESTIMATING PROCEDURES

By Donald Tarne
Chicago Forging and Manufacturing Company

Chicago Forging and Manufacturing Company is in the metal stamping business. Its principal product is hood latches for automobiles. Its business is quite seasonal and it is going through a period of major changes right now as new model cars are being manufactured.

Chicago Forging started using MTM for establishing labor standards in March of 1953. We use standard data based on MTM on our Secondary Punch Press Department and individual analyses by MTM in our Assembly and Welding Department and in our Final Assembly Department. Other departments which have less productive labor hours are covered by time study and standard data based on time study.

Towards the end of 1953 we started to compare our standard labor costs based upon MTM for our piece parts to our estimated labor costs which at that time were made on a somewhat over-all basis. We devised a form to make this comparison of estimated costs and standard costs (Exhibit I) and distributed this form to the management and individuals who were concerned with our standard costs. The comparison of estimated costs to standard costs shows: part name, part number, operation description, standard cost, estimated cost, and amount under estimate or amount over estimate. We total each of the columns, standard cost, standards over estimate, and standards under estimate, and we calculate our per cent of gross deviation and per cent of net deviation. The per cent of gross deviation is the total of all standards under estimate plus all standards over estimate, divided by the standard cost, and shows the actual per cent of total difference between our estimated and our standard cost. The per cent of net deviation is the difference between all standards under estimate and all standards over estimate, divided by the standard cost, and shows if our estimates on the average are close to our standards.

After we had made the comparison for a short period we became aware of large discrepancies between the estimated costs and the standard costs. In February we changed our procedure to use MTM for making estimates as well as for establishing standards. There is a lag of approximately four months between the time a job is estimated and the time a labor standard is established in the shop, so that it was not until June that the estimates and corresponding labor standards were both set by MTM.

Exhibit I

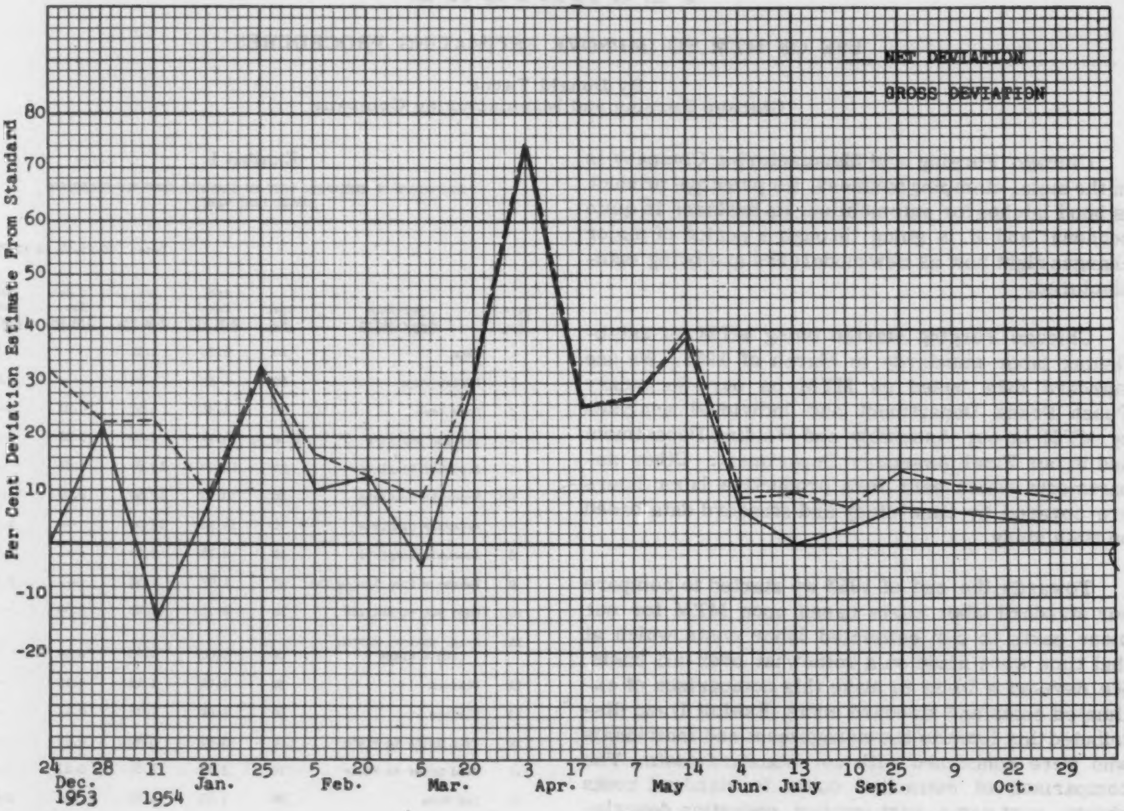
COMPARISON OF ESTIMATED COST TO STANDARD COST FOR STANDARDS ISSUED LAST WEEK.

Date: 10-25-54 to 10-29-54

Part No.	Operation Description	Oper. No.	Std. Cost $/M Pc.	Est. Cost $/M Pc.	Under Est. $/M Pc.	Over Est. $/M Pc.
1	Form	20	1.26	1.11	---	0.15
2	Finish Form	20	1.15	1.11	---	0.04
3	Form Bend	30	1.31	1.51	0.20	---
4	1st and 2nd Form	20 & 30	3.44	3.45	0.01	---
5	Assemble Complete	10	12.00	13.85	1.85	---
6	Assemble Complete	10	10.50	12.50	2.00	---
7	Assemble Complete	10	14.30	13.00	---	1.30
8	Assemble Complete	10	6.28	6.20	---	0.08
9	Emboss & Form Spring Tab	30	1.97	1.52	---	0.45
10	Weld Nut to Bracket	10	2.71	2.80	0.09	---
11	Prog. pierce, notch, form & blank	10	0.60	0.65	0.05	---
12	Flatten	30	1.04	1.15	0.11	---
13	Flatten	30	1.04	1.15	0.11	---
14	Weld Guide to Plate	10	3.67	3.80	0.13	---
15	Weld Guide to Plate	10	3.67	3.80	0.13	---
16	1st Form	20	1.53	1.52	---	0.01
17	1st Form	20	1.11	1.11	---	---
18	Form	20	1.02	1.11	0.09	---
19	Weld Guide to Plate	10	3.72	3.76	0.04	---
20	Extrude - Form sides down and front up	20	1.53	1.64	0.11	---

Both the men who do the estimating and the men who prepare the labor standard work for the same department, have had MTM training and have access to the same standard data. The estimator must visualize the job, process it, and use judgment in such areas as class of fit and length of motions in establishing the labor estimate. A tool committee reviews the estimate to make sure the processing and tooling specified will actually be carried out in practice. The estimates are used to establish the selling price and are not used as labor standards in the shop. The individual establishing the labor standard has access to the estimate although he is discouraged from using it except to compare methods when the labor standards and estimates are different. The present procedure has helped detect method improvements. There are very few methods improvements made by the operators since a thorough engineering job has been done before the job reaches the shop. A complete methods description is issued with each standard.

Exhibit II



We plotted the information received from the comparison of estimated to standard cost on a chart (Exhibit II). The first part of the chart represents the period when the estimating was done by the old system and standards were set by MTM. The gross error ranged from 8.5% to 75%. The net error ranged from .3% to 75%. There was a wide range between the estimates and the standards and there also was a high degree of inconsistency between the estimate and standard. There was some slight overlap between the old system of estimating and the MTM system, but starting approximately June 4 the estimate and the corresponding standard were both set by MTM. Since that time, both the gross error and the net error have decreased. The gross error now ranges from 8.3% to 13.3%. The net error ranges from 0% to 6.7%. As the chart shows, there is a much higher degree of consistency between estimates and standards. The estimates on the average are still a little high due to conservatism on the part of the estimator. A net error of 0% would be desirable and would indicate that there are an equal number of estimates above and below the standards. Right now our estimates are running from approximately 0.8% below to approximately 8.6% above our standards. The results: MTM is giving us a much more accurate labor estimate and helping us to compete better in the present day competitive market.

PRESENT STATUS OF POSITION RESEARCH PROJECT

The basic research project on Position is now in process, though still in its very early stages. A brief report at this time, however, should be of interest to the members of the Association. It will give them a general picture of the structure of the project and in what terms the research will be carried to completion. Since the material being presented here is the product of preliminary planning, it should be viewed as only a tentative outline which will be modified and changed as the research progresses and more information about the subject becomes available.

The project will be broken down into four separate studies, each being reported separately. The four combined reports will then constitute a general study of the Position element. It should be understood that these four studies are not completely independent, but in many ways are closely interrelated. The purpose served in separating various aspects of Position is twofold: to allow a concentrated treatment of each aspect, providing an uncluttered understanding of it, and to make possible more frequent reports of research results to the Association. However, in no way will a thorough investigation of the interrelationships of the Position subcategories be sacrificed by so doing.

The four general studies to be carried out in this project are

1. A study of Alignment — here will be studied the effect of increasing precision in bringing an object to a predetermined location. This is essentially a linear movement. In addition, the effect of size and shape of the object and destination will be considered.
2. A study of Orientation — here will be studied the effect caused by the necessity of rotating the object so that it can be placed in a predetermined location. The crucial factor here is the shape or "symmetry" of the object as it acts to determine the amount of rotation required. In addition, the relative size and shape of the object and destination may force a larger or smaller degree of precision in orientation and therefore will be studied.
3. A study of Engagement — here will be studied the placing of the object on or in a predetermined location. When the object is placed on a surface where the fit is quite loose, the engagement may be indistinguishable from an ordinary MTM Move element. However, as the degree of fit of the object in the indentation becomes tighter, this will no longer be true. Therefore, the effect of increasing tightness of fit in engagement will be studied. In addition, possible effects due to the size and shape of the object will be investigated.
4. A study of Alignment, Orientation and Engagement in combination — here will be studied the various possible interactive relationships between these three subelements of Position. The various combinations are as follows:

   a) Alignment alone
   b) Orientation alone
   c) Engagement alone
   d) Alignment with Orientation
   e) Alignment with Engagement
   f) Orientation with Engagement
   g) Alignment and Orientation with Engagement.

From all these studies it is hoped that sufficient information will be developed so that the Position element in general, or any combination of its subelements in particular, can be handled easily and accurately in application. To provide information concerning the motion characteristics of Position and its subelements, a laboratory set-up will be used. This will provide a balanced and controlled experiment in which each critical variable will be properly represented. A fairly complete general picture of position should result. In determining actual performance times of Position and its subelements, a large comprehensive random sample of industrial data will be collected and used, thus ensuring that times values will reflect actual industrial performance. It is expected that all data, laboratory and industrial, will be recorded on film at a high exposure speed, probably 4000 frames per minute. This would provide a measuring unit of only .41% TMU.

This, in a very general way, is the present planning for the new research project. As work progresses, many of its details will be changed or modified. However, the general framework should remain essentially the same.

APPLICATION

THE USE OF MULTI-VARIABLE CHARTS TO SIMPLIFY MTM STANDARD DATA

by T. R. Snakenberg
Deere & Company
Industrial Engineering Division

Multi-variable charts are valuable when it is necessary to show standards in terms of three or more variables. Such charts were not often used with time study standards since rarely was it possible to establish standards accurately for operations involving more than two variables. With MTM they have a much wider application and are an extremely valuable tool to simplify standard data and reduce the time required to apply it.

To illustrate the use of multi-variable charts, we will follow the steps in developing a multi-variable chart for a portion of a Radial Drill Standard. The standard must be simple and relatively easy to apply, because the actual Radial Drill operations have a fairly long cycle (many being 20 to 30 minutes in length) and consist of many short cycle elements. Through the use of multi-variable charts it is possible to combine the time values for these elements into longer more usable values; thereby, simplifying the application of M T M Standard Data.

A drawing of the equipment and fixture is shown on page number 82. Standards were developed using MTM for the elements required to move the tool from one hole to the next. The elements and their variables were:

Element	Variable
1. Up spindle	Depth of *previous* hole
2. Swing and traverse head	Distance Head is Traversed on Arm
	Distance Arm is Swung
3. Down spindle	Constant

The time values for these elements are shown in the following tables:

1. Up Spindle Values (Western Radial Drill)

Table I

Depth of Previous Hole in Inches	Normal Minutes to Up Spindle
0-1	.010
2	.013
3	.015
4	.017
5	.019
6	.022
7	.024

2. Swing and Traverse Head Values (Western Radial Drill)

Table II

Traverse of Head in Inches	Swing of Head In Inches						
	1	2	3	4	6	8	10
1	.024	.027	.030	.032	.034	.035	.037
2	.028	.031	.034	.036	.038	.039	.041
3	.032	.035	.038	.040	.042	.044	.045
4	.036	.039	.042	.044	.046	.048	.049
5	.041	.043	.046	.048	.050	.052	.053
6	.045	.047	.050	.052	.054	.056	.057
7	.049	.051	.054	.056	.058	.060	.061
8	.053	.056	.058	.060	.062	.064	.066
9	.057	.060	.062	.064	.066	.068	.070
10	.061	.064	.066	.068	.070	.072	.074

3. Down Spindle Value (Western Radial Drill)

Constant .014 Normal Minutes

As a first step in simplifying these data, Element 2 was combined with Element 3. The time values for this combination are as follows:

4. Down Spindle Constant Value Plus Swing and Traverse Table Values

Table III

Traverse of Head in Inches	Swing of Head in Inches						
	1	2	3	4	6	8	10
1	.038	.041	.044	.046	.048	.049	.051
2	.042	.045	.048	.050	.052	.053	.055
3	.046	.049	.052	.054	.056	.058	.059
4	.050	.053	.056	.058	.060	.062	.063
5	.055	.057	.060	.062	.064	.066	.067
6	.059	.061	.064	.066	.068	.070	.071
7	.063	.065	.068	.070	.072	.074	.075
8	.067	.070	.072	.074	.076	.078	.080
9	.071	.074	.076	.078	.080	.082	.084
10	.075	.078	.080	.082	.084	.086	.088

To further simplify these data a multi-variable chart was developed which combines all three elements into one table. The steps in developing the multi-variable chart were as follows: (refer to Work Sheet, Exhibit II).

1. Table III was examined for the range of time values (.038 to .088). It was decided that accuracy of ± 2 1/2% was adequate and a 5% increment reference line was calculated and posted in the work sheet for this range.

2. One of the variables, "traverse of head in inches," was used as the horizontal heading to the left.

3. The second variable, "swing of head in inches," was posted in the body of the work sheet to the left of the reference line. For example, a 1" swing and 1" traverse has a time value of .038. The 1" swing was posted horizontally across from .038 and vertically under 1" traverse. Similarly the actual value for 4" traverse and 3" swing is .056. Because there is no .056 value shown on the reference line, the 3" swing is posted opposite .055, since .056 is closer to .055 than to .058. Actual values are always posted opposite the reference line values which are closest.

4. Element 1 and its time values were entered as headings to the right of the vertical reference line.

5. The values for the body of the table to the right of the vertical reference line were calculated by adding the time values in the vertical reference line to the time values for Element 1. For example, at the intersection of reference line .038 and 0-1" depth, the time value .048 is entered. This is the total of the reference line value (.038) and Element 1 value for 1" (.010).

6. The completed chart is prepared without the reference line or the time values for Element 1. This chart is shown as Exhibit III.

7. The accuracy of the multi-variable chart can be checked by comparing the total of the individual elemental values and the value obtained from the final multi-variable chart. Two such checks are as shown on Exhibit IV.

Exhibit I

Building of Multi-Variable Chart with Two Points of Entry
For Element: Up Spindle: Swing and Traverse Head, and Down Spindle (Western Radial Drill)

Normal Minutes

Exhibit II

Multi-Variable Chart with Two Points of Entry and with Reference Included for Element: Up Spindle: Swing and Traverse Head, and Down Spindle (Western Radial Drill)

Normal Minutes

Traverse of Head in Inches										Ref. Line	Depth of Previous Hole in Inches						
0-1	2	3	4	5	6	7	8	9	10		0-1	2	3	4	5	6	7
											.010	.013	.015	.017	.019	.022	.024
0-1										.038	.048	.051	.053	.055	.057	.060	.062
										.040	.050	.053	.055	.057	.059	.062	.064
2	0-1									.042	.052	.055	.057	.059	.061	.064	.066
3						Maximum Swing of Head				.044	.054	.057	.059	.061	.063	.066	.068
4	2	0-1				in Inches				.046	.056	.059	.061	.063	.065	.068	.070
6	3									.048	.058	.061	.063	.065	.067	.070	.072
8	4	2	0-1							.050	.060	.063	.065	.067	.069	.072	.074
10	8	3	2							.052	.062	.065	.067	.069	.071	.074	.076
	10	6	3	0-1						.055	.065	.068	.070	.072	.074	.077	.079
		8	4	2						.058	.068	.071	.073	.075	.077	.080	.082
		10	6	3	0-2					.060	.070	.073	.075	.077	.079	.082	.084
			10	6	3	0-1				.063	.073	.076	.078	.080	.082	.085	.087
				10	4	2	0-1			.066	.076	.079	.081	.083	.085	.088	.090
					8	4	2			.069	.079	.082	.084	.086	.088	.091	.093
					10	6	3	0-1		.072	.082	.085	.087	.089	.091	.094	.096
						10	6	3	0-1	.076	.086	.089	.091	.093	.095	.098	.100
							10	6	3	.079	.089	.092	.094	.096	.098	.101	.103
								10	6	.083	.093	.096	.098	.100	.102	.105	.107
									10	.088	.098	.101	.103	.105	.107	.110	.112
										1.129	1.319	1.376	1.414	1.452	1.490	1.547	1.585
										Check (19xEl 1)	.190	.247	.285	.323	.361	.418	.456
											1.129	1.129	1.129	1.129	1.129	1.129	1.129

Exhibit III

Completed Multi-Variable Chart with Two Points of Entry and with Reference Lines not Included Element A51B1: Up Spindle: Swing and Traverse Head, and Down Spindle (Western Radial Drill)

Normal Minutes

Traverse of Head in Inches										Depth of Previous Hole in Inches						
0-1	2	3	4	5	6	7	8	9	10	0-1	2	3	4	5	6	7
0-1										.048	.051	.053	.055	.057	.060	.062
										.050	.053	.055	.057	.059	.062	.064
2	0-1									.052	.055	.057	.059	.061	.064	.066
3										.054	.057	.059	.061	.063	.066	.068
4	2	0-1				Swing of Head				.056	.059	.061	.063	.065	.068	.070
6	3					in Inches				.058	.061	.063	.065	.067	.070	.072
8	4	2	0-1							.060	.063	.065	.067	.069	.072	.074
10	8	3	2							.062	.065	.067	.069	.071	.074	.076
	10	6	3	0-1						.065	.068	.070	.072	.074	.077	.079
		8	4	2						.068	.071	.073	.075	.077	.080	.082
		10	6	3	0-2					.070	.073	.075	.077	.079	.082	.084
			10	6	3	0-1				.073	.076	.078	.080	.082	.085	.087
				10	4	2	0-1			.076	.079	.081	.083	.084	.088	.090
					8	4	2			.079	.082	.084	.086	.088	.091	.093
					10	6	3	0-1		.082	.085	.087	.089	.091	.094	.096
						10	6	3	0-1	.086	.089	.091	.093	.094	.098	.100
							10	6	3	.089	.092	.094	.096	.098	.101	.103
								10	6	.093	.096	.098	.100	.102	.105	.107
									10	.098	.101	.103	.105	.107	.110	.112

Example Showing How to Read Chart:

Conditions: (1) Traverse Head 2" (2) Swing Head 2" (3) Depth of Previous Hole 1".

Solution: Enter table at 2" Traverse of Head; move down column to 2" Swing of Head, and then move horizontally across page to 0-1" Column under Depth of Previous Hole and read the time value at this point, i.e., .056 Normal Minutes.

Note: The Above element has been developed purely as an illustration. Therefore, the time may not be 100% accurate for the element.

Exhibit IV

Check to Determine Validity of Multi-Variable Chart with Two Points of Entry

1. Conditions:

Traverse Head	3"
Swing Head	5"
Depth of Previous Hold	2"

Build-up of Values from Individual Tables:

	Normal Minutes
Up Spindle	.013
Swing & Traverse Head	.042
Down Spindle	.014
Total	.069
From Multi-variable Table	.068 Normal Minutes.

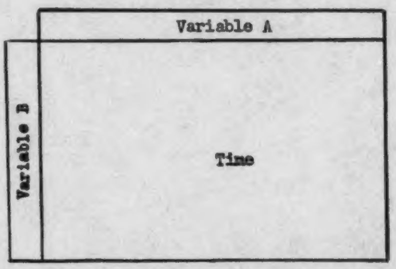
2. Conditions:

Traverse Head	8"
Swing Head	10"
Depth of Previous Hole	6"

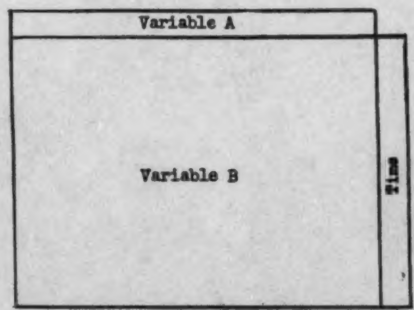
Build-up of Values from Individual Tables:

	Normal Minutes
Up Spindle	.022
Swing & Traverse Head	.066
Down Spindle	.014
Total	.102
From Multi-variable Table	.101 Normal Minutes.

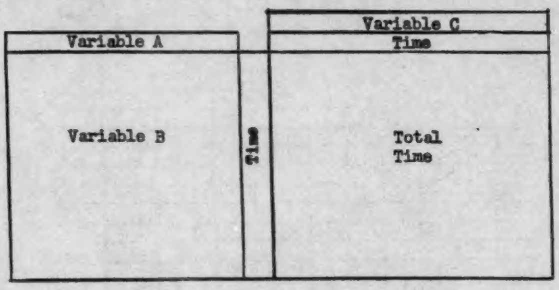
The real secret to building any multi-variable chart is literally turning the original two-variable charts "inside out." For example, a normal two-variable time chart appears as follows:



When this chart is turned "inside out" it looks like:

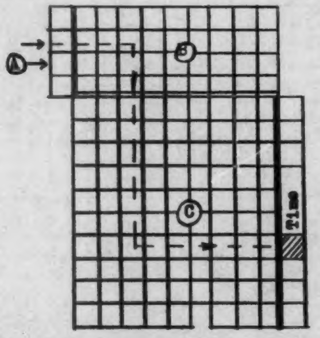


It is then possible to add a third variable as follows:

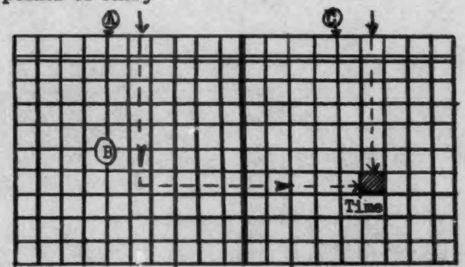


Diagrams of Various Layouts of Multi-Variable Tables

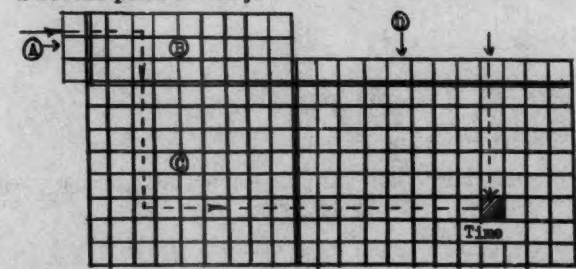
(a) Diagram of three variables - A,B, and C with one point of entry



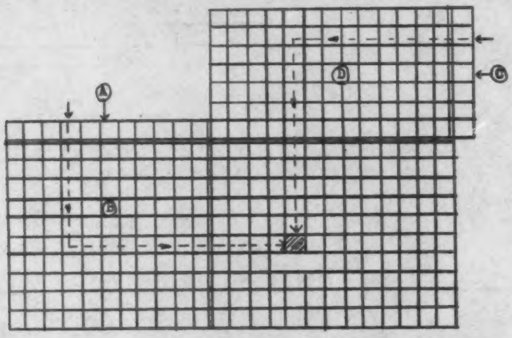
(b) Diagram of three variables - A,B, and C with two points of entry



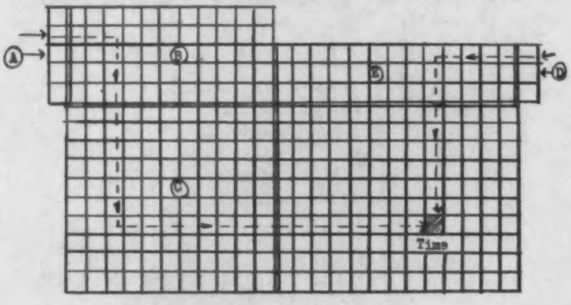
(c) Diagram of four variables - A,B,C, and D. Three from one point of entry & one variable from a second point of entry.



(d) Diagram of four variables - A,B,C, and D. Two from each of two different points of entry.



(e) Diagram of five variables - A,B,C,D, and E. Three variables from one point of entry and two variables from a second point of entry.



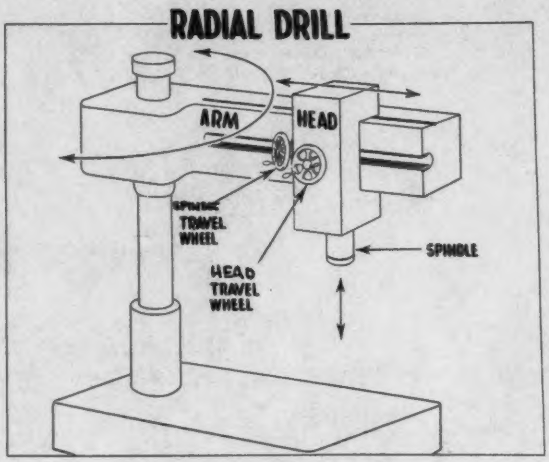


Figure 1.

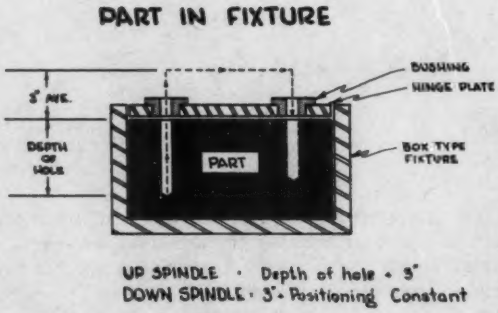
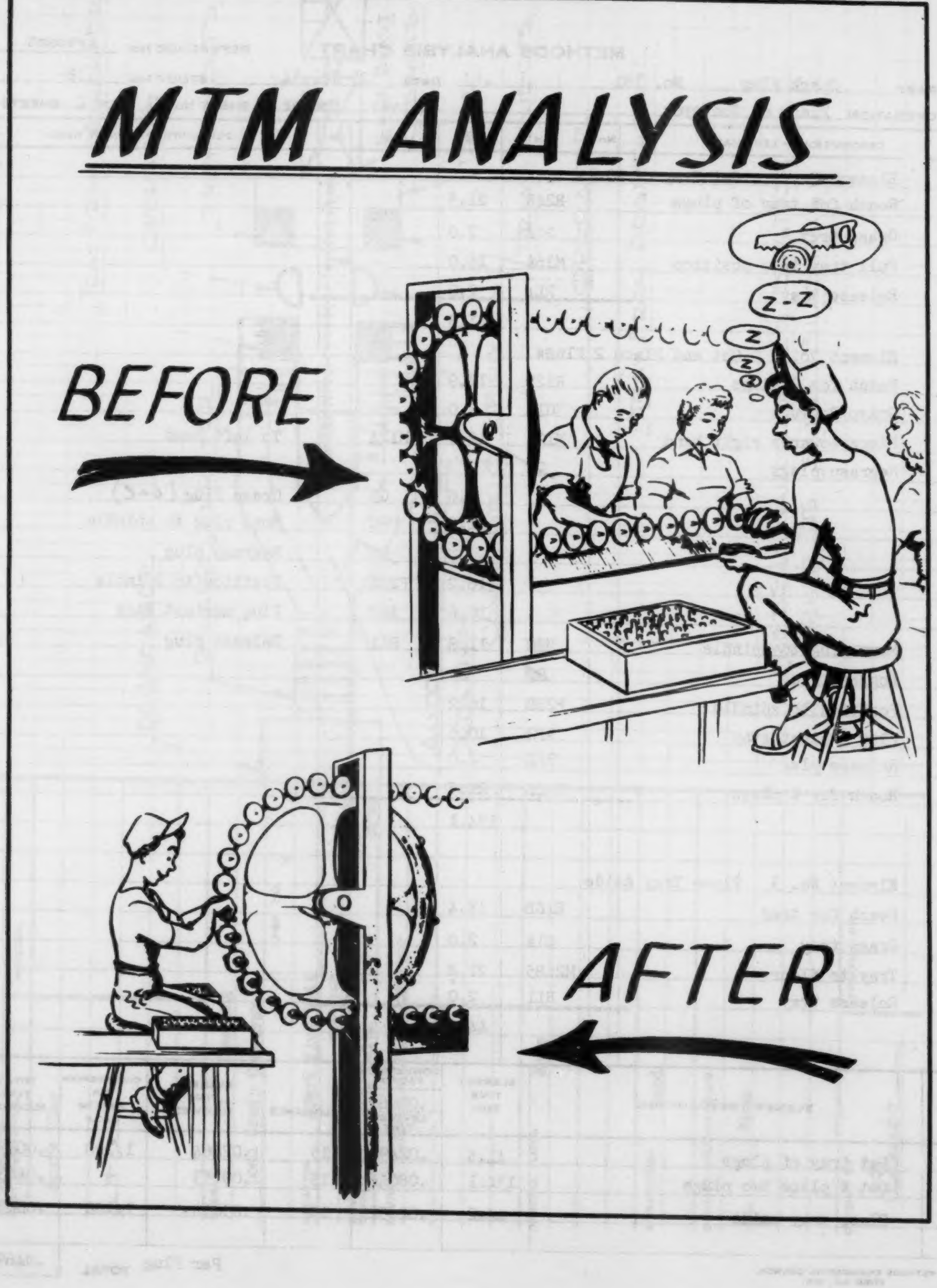


Figure 2.


MTM ANALYSIS
BEFORE
Z-Z
Z
Z
AFTER

PRESENT METHOD

METHODS ANALYSIS CHART

REFERENCE No. Present

PART Spark Plug No. 181 DATE 23 Jul 54 STUDY No. 118

OPERATION Place on Conveyor ANALYST Brauer SHEET No. 1 OF 2 SHEETS

DESCRIPTION — LEFT HAND	No.	L H	TMU	R H	No.	DESCRIPTION — RIGHT HAND
Element No. 1 Get Tray of Plugs						
Reach for tray of plugs		R24B	21.5			
Grasp tray		G1A	2.0			
Pull tray into position		M16A	16.0			
Release tray		RL1	2.0			
			41.5			
Element No. 2 Get and Place 2 Plugs						
Reach for 2 plugs		R12B	12.9			
Grasp 2 plugs		G1A	2.0			
Plugs towards right hand		M12A	12.9	M12A		To left hand
Regrasp plugs		~~G2~~				
			5.6	G3		Grasp Plug (one)
			11.8	M8C		Move plug to spindle
				~~G2~~		Regrasp plug
			16.2	P2SE		Position to spindle
			10.6	AP2		Plug against stop
Move plug to spindle		M8C	11.8	RL1		Release plug
Regrasp Plug		~~G2~~				
Position to spindle		P2SE	16.2			
Plug against stop		AP2	10.6			
Release plug		RL1	2.0			
Reach for 2 plugs		R24B	21.5			
			134.1			
Element No. 3 Place Tray Aside						
Reach for tray		R18B	18.4			
Grasp tray		G1A	2.0			
Tray to floor		M26B5	21.8			
Release tray		RL1	2.0			
			44.2			

No.	ELEMENT DESCRIPTION	ELEMENT TIME TMU	CONVERSION FACTOR .0006 LEVELED TIME	% ALLOWANCE	ELEMENT TIME ALLOWED	OCCURRENCES PER PIECE OR CYCLE	TOTAL TIME ALLOWED
1.	Get tray of plugs	41.5	.02490	15	.02864	1/100	.0003
2.	Get & place two plugs	134.1	.08046	15	.09253	½	.0463
3.	Place tray aside	44.2	.02652	15	.03050	1/100	.0003
						Per Plug TOTAL	.0469

METHODS ENGINEERING COUNCIL FORM NO. 198

DWG. No. CH. 181

PART DESCRIPTION: Spark Plug

MATERIAL:

OPERATION: El Cleaning
Load Chain Conveyor

OPER. NO. 6

LOCATION: Spark Plug Unit

OPERATOR
~~MAN~~ WOMAN — NAME: L. Clothier, G. Smith — **NO.** 641, 8756

EQUIPMENT: None - Chain Conveyor

SPECIAL TOOLS: None

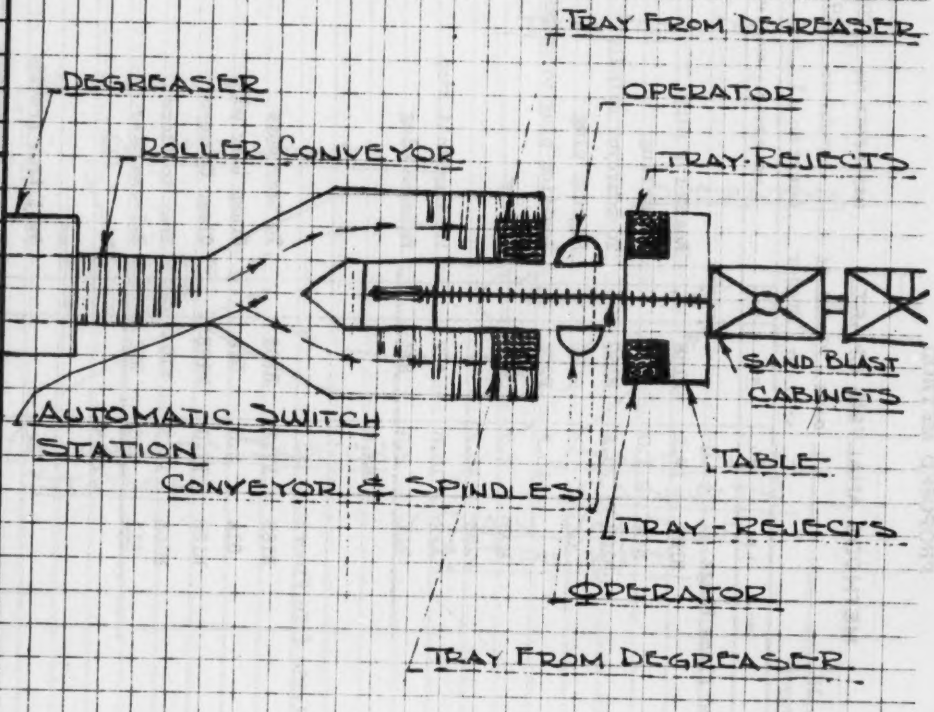
CONDITIONS: Good

QUALITY REQUIREMENTS: None

STUDIED BY: Brauer

APPROVED BY:

SKETCHES (EQUIPMENT, TOOLS, PARTS, WORK PLACE LAYOUT, ETC.)



PRESENT HAND LOADING STATION PRIOR TO SAND BLASTING

PROPOSED METHOD

METHODS ANALYSIS CHART

REFERENCE No. Proposed

PART Spark Plug No. 181 DATE 23 Jul 54 STUDY No. 119

OPERATION Place on Conveyor ANALYST Brauer SHEET No. 1 OF 1 SHEETS

DESCRIPTION — LEFT HAND	No.	L H	TMU	R H	No.	DESCRIPTION — RIGHT HAND
Element No. 1 Get and Place Plugs						
Reach for plug		R18B	17.2	R18B		Reach for plug
Grasp Plug		G1A	2.0	G1A		Grasp Plug
Towards Conveyor spindle		M16B	20.4	M18C		To conveyor spindle
Regrasp plug		~~G2~~		~~G2~~		Regrasp plug
			16.2	P2SE		Position plug to spindle
To conveyor spindle		M2C	4.2			
Position to spindle		P2SE	16.2			
Push Against Stop		AP2	10.6	AP2		Push against stop
Release plug		RL1	2.0	RL1		Release plug
			88.8			
Element No. 2 Trays Aside (To Floor)						
To tray edge		R18B	17.2	R18B		To tray edge
Grasp tray edge		G1A	2.0	G1A		Grasp tray edge
Clear Conveyor		M18B	17.0	M18B		Clear Conveyor
Tray to Floor		M10A	11.3	M10A		Tray to floor
Release tray		RL1	2.0	RL1		Release tray
			49.5			
Next tray gravity						Next tray gravity
Feeds into place						Feeds into place

No.	ELEMENT DESCRIPTION	ELEMENT TIME TMU	CONVERSION FACTOR .0006 LEVELED TIME	% ALLOWANCE	ELEMENT TIME ALLOWED	OCCURRENCES PER PIECE OR CYCLE	TOTAL TIME ALLOWED
1.	Get & Place plugs	88.8	.05328	15	.06127	½	.0306
2.	Trays aside	49.5	.02970	15	.03416	1/100	.0003

METHODS ENGINEERING COUNCIL FORM NO. 196

Per Plug TOTAL .0309

DWG. No. CH. 181

PART DESCRIPTION Spark Plug

MATERIAL

OPERATION Cleaning

Load chain conveyor

OPER. NO. 6

LOCATION Spark Plug Unit

OPERATOR

MAN WOMAN | **NAME** | **NO.**

EQUIPMENT None - Chain Conveyor

SPECIAL TOOLS None

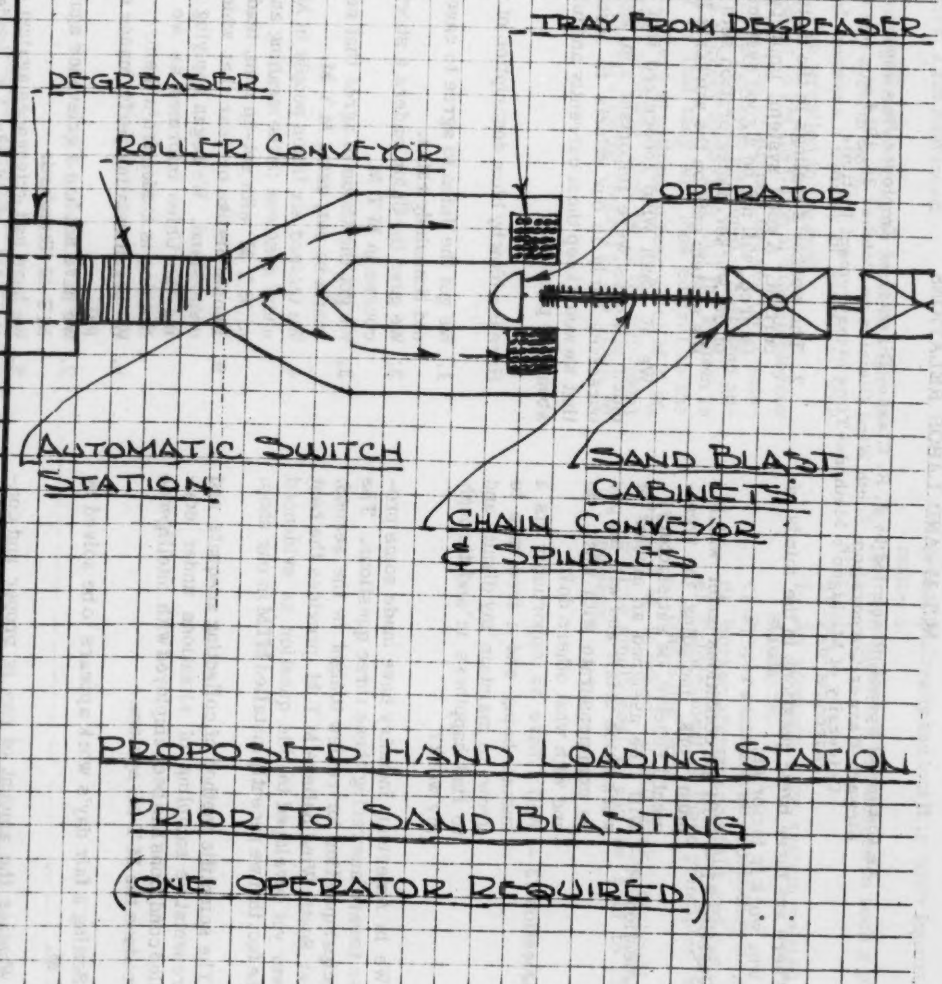
CONDITIONS Good

QUALITY REQUIREMENTS None

STUDIED BY Brauer

APPROVED BY

SKETCHES (EQUIPMENT, TOOLS, PARTS, WORK PLACE LAYOUT, ETC.)



M T M AND LABOR RELATIONS

An Outline of Speech Presented by J. R. Clarke, Director of Employee Relations Stewart-Warner Corporation, South Wind Division on October 25, 1954 at University of Michigan's Methods-Time Measurement Institute

There are three basic questions in the minds of men who work in factories:

Question #1 – Will the conditions under which I must work, including the treatment I receive, be satisfactory?

Question #2 – Will I be assigned an amount of work which is fair and will my pay be commensurate with what I do and with what others do?

Question #3 – Will I have an opportunity as a human being and a free man to grow, to maintain my dignity and to find happiness in and through my work?

We in American Industry have made some progress toward answering these three questions. The principal question for review tonight is the second. We at South Wind believe M T M provides the best answer yet developed to this question as evidenced by the fact that we recently installed MTM in our shop.

The scientific method of collecting adequate and representative sampling of situations under controlled conditions has been employed with intelligence to produce the M T M system.

Setting a fair day's work appears to be solved by M T M.

Whether the amount of pay is proper and consistent for the work performed is a function of the wage payment system employed, be it incentive, measured day work or what have you.

While it is true that the task to be performed, whether measured or not, is not affected by the wage payment system, these two considerations namely, the task and the amount of pay for the task, do come together in the mind of the worker.

If the wage system is improper, then the worker will condemn both the system for setting the task and the system of wage payment.

Out of this, two things emerge:

1. It is not enough simply to install or service an M T M System without regard to the wage payment system. They go together.
2. The worker's feelings in the matter are important. A good system, improperly administered, will not be a good system in the eyes of the worker. Deterioration sets in fast once the system gets on the worker's list.

We at South Wind recognized that worker and union attitudes were important and agreed among ourselves early in our efforts to install M T M that we would keep them currently and fully informed about our progress.

Here is a blow by blow description of what we did:

1. We got the Union to agree to cancel all of our old timestudy rates.
2. We gave the Union leaders a short orientation course in M T M.
3. We got the Union to agree that new standards would be set, using M T M.
4. We trained six Union people in M T M, held short sessions on the meaning and application of M T M with set-up men, leaders, etc.
5. People dislike or fear that which they don't understand. We began applying rates, keeping the Union informed as we went along. Nothing is hidden from them.
6. We began relating performance on M T M to pay.
7. We have not had a grievance against a single M T M Standard.
8. We have had grievances against our application of the standards, i.e., inadequate allowance, improper setup and so on; but not one against the standards themselves.
9. We included M T M in our Union Agreement.
10. We have established, and watch carefully, the no cheating rule – either way. A standard must be set right and fair and the worker must work according to it.

M T M in our plant is as firm as any policy or system we have. Questions arise concerning its administration or application, but not about the task.

We have no problems regarding leveling, or estimates or differences in timestudy men or over the system itself.

There is little room left for argument except in how we administer or apply the system.

In summary, I am convinced:

1. The management philosophy must be right to make any system work.
2. M T M answers a number of questions with which I've wrestled in the past.
3. It is better to get the Union and the employees in the act than to attempt to keep them uninformed or partially informed. Those who advocate secrecy either fear that the system is unfair or that they will lose control to the Union. There is nothing to fear about M T M. The real problem must be in the individual and if he fears losing control to the Union, he probably already has lost it in other important matters.
4. The five elements of success in such a plan are:
   a) Fair standards.
   b) An adequate wage system related to standards.
   c) Proper administration of both systems.
   d) Worker acceptance of the end result.
   e) Enforcement of these principles on a continuing basis.
5. M T M is sound. It will work. It should be sold to employees; it can be sold to employees.

MTM NEWS

The Central Iowa MTM Association, a Chapter of the National Association, has recently elected officers for 1954-1955. They are as follows:

President:	R. E. Gerhardt Meredith Publishing Company Des Moines, Iowa
Vice-President	Carl Brokaw New Monarch Machine Company Des Moines, Iowa
Secretary	Dan Griffin Armstrong Rubber Mfg. Company Des Moines, Iowa
Treasurer	Herman Fortner Armstrong Rubber Mfg. Company Des Moines, Iowa

The MTM Association extends congratulations and best wishes for the coming year's activities of the Central Iowa Chapter.

Annual Meeting

The Annual Meeting of the MTM Association will be held January 28, 1955 at the Union League Club in Chicago.

New officers and directors will be elected at this meeting of the entire membership of the Association.

Committee chairmen will present reports on their committees' activities for the past year.

Financial reports for the year 1954, and budgets for the coming year will also be presented.

RESEARCH REPORTS

Disengage (Report 101)

This report contains a preliminary study of the element disengage. While it is still classified as tentative, the report contains some extremely interesting conclusions on the nature and theory of this element.

Reading Operations (Report 102)

The first step in the use of MTM for establishing reading time standards is contained in this report. In addition, the report contains a synopsis of the work done in this field by 11 leading authorities.

MTM Analysis of Performance Rating Systems (Report 104)

A talk presented at the SAM - ASME Time and Motion Study Conference, April 1952. It contains an analysis of performance rating systems and various performance Rating Films from an MTM standpoint.

Simultaneous Motions (Report 105)

This report represents almost two man-years' work on a study of Simultaneous Motions. It is a final report of the Simultaneous Motions project undertaken by the MTM Association. While it does not purport to provide complete and exhaustive answers to all problems in the field of Simultaneous Motions, it presents a great deal of new and valuable information which should be of interest to every MTM practitioner.

Short Reaches and Moves (Report 106)

This report contains an analysis of the characteristics of Reaches and Moves at very short distances. It develops important conclusions concerning the application of MTM to operations involving these short distance elements.

Research Methods Manual (Report 107)